

# **McKinley Street, N.W. Traffic Calming Study**

*Prepared for:*

**District Department of Transportation  
Transportation Policy and Planning Administration**

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The following report of the McKinley Street, N.W. traffic calming study is comprised of the following elements:

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## **I. Introduction**

The District Department of Transportation (DDOT) was requested to provide a traffic calming study for McKinley Street, N.W. (blocks 3700 to 3400) spanning from Connecticut Avenue, N.W. east to Broad Branch Road, N.W. as well as the neighboring streets from the north, Oliver Street, N.W. south to Livingston Street, N.W (*see Appendix A: Study Area*). In performing said task, the potential implementation of traffic calming measures will be investigated in compliance with the District of Columbia Traffic Calming Policies and Guidelines 2002 to improve traffic safety within the McKinley Street study area.

The primary objective of this traffic calming study, as determined through public interests, will be to provide enhanced pedestrian, cyclist and resident safety through a variety of vehicular cut-through traffic volume and speed reduction devices. Traffic data for the study area (vehicular traffic counts, accident data, speed readings and turning movements), in addition to site geometry and vehicle, bicycle and pedestrian contributions to traffic patterns will determine which means and locations of traffic calming measures will best improve traffic safety for the study area and maintain the level of service of McKinley Street. Any recommendations deemed acceptable by DDOT and the public will be implemented in the field and further studied by DDOT for their effectiveness in achieving District traffic calming objectives over a six month period following installation.

## II. Study Findings

McKinley Street, N.W. has the functional classification of a collector street. It is not a District snow emergency route, however is plowed and salted by WMATA to maintain bus services. Four metro bus lines utilize McKinley Street to provide public transportation for the area. A mixed use of vehicular, bicycle and pedestrian traffic utilize McKinley Street.

The portion of McKinley Street under investigation (3700 to 3100 blocks) is approximately 3,600 feet or  $\frac{3}{4}$  of a mile long and cuts through a residential community. This new study area boundary was extended to provide a more comprehensive study as explained in the recommendations portion of this report. The road way corridor (curb to curb) measures 28 feet. The study area supports a community center, library, elementary school and approximately 500 homes, 90 of which border McKinley Street. The posted speed limit throughout the McKinley Street, N.W. study area is 25 m.p.h.

Lafayette Elementary School, sited within the study area on the 5600 block of Broad Branch Road is a weekday destination for resident students. Before and after school, adults and children come to and from McKinley Street by way of Broad Branch Road and represent a consistent safety concern when exposed to roadways sustaining traffic with high volume and excessive speeds. The Chevy Chase Community Center and Library, at the intersection of Connecticut Avenue and McKinley Street, also provide a busy gathering place for people of all ages. Residential bicycle and pedestrian traffic were observed throughout the study area and will be the primary objective in instituting traffic calming objectives for McKinley Street, N.W.

McKinley Street, N.W. services four buses. One, the E6 as indicated on the metro bus route map provided on the WMATA web site runs along McKinley Street from Connecticut Avenue to Broad Branch Road where it exits northbound weekdays only at all times. The others, the E2, E3 and E4 run along McKinley Street from Connecticut Avenue to 30<sup>th</sup> Place all week at all times.

Nine bus stops are located at the intersections of McKinley Street as designated by concrete bus pads and metro bus signage on the plan views provided in this study (*See Appendices D1-8*). It is a responsibility of both WMATA and DDOT to provide safe and dependable access to their services at these locations. It was reported by a WMATA official that despite the existing two lane configuration divided by double yellow pavement striping, vehicles traveling in the opposing direction of buses are often required to stop to allow for buses to pass.

Bus stop frequency in the study area was reported by a metro representative as every 10 minutes during the day, 10-20 minutes after 8 p.m. and 40 minutes midnight to 6:30 a.m. Information provided by WMATA suggests that on average there are 204 bus trips per day during the weekdays and 98 on the weekends. Maintaining efficient operation of metro buses routes through the McKinley Street study area will be another objective in making traffic calming recommendations for the area.

The horizontal alignment of McKinley Street, N.W. is a straight line running east and west from Western Avenue, N.W. to Utah Avenue, N.W. Street grades along McKinley Street, N.W. fall below the maximum allowable value of 7 % for traffic calming consideration (*See Appendix B: Profile Grade Line*), however, do contribute to safety concerns where excessive vehicle speeds were observed. Also present are the locations of two vertical peaks (stations 4+00 and 26+00) where sight distance is limited and driver reaction times suffer. These locations will not qualify for traffic calming consideration because of the previously mentioned safety concerns.

Two existing roadway configurations were found on McKinley Street, N.W. One, the portion of McKinley Street west of Broad Branch Road provides parallel parking on one side of the road and an established travel way in both east and westbound directions separated by solid double yellow pavement striping. The other configuration, found east of Broad Branch Road where parking is available on both sides of the street offers a shared vehicular passage way with no solid double yellow pavement striping.

Traffic counts for the McKinley Street, N.W. study area were taken at four locations; McKinley Street, Morrison Street, Broad Branch Road and Nebraska Avenue. Other counts within the study area were available from the 2000 Traffic Volumes provided by the Department of Public Works Traffic Services Administration (*See Appendix C1: Traffic Counts*). Count locations performed for this report were determined in order to provide insight into traffic patterns on McKinley Street and the surrounding roadways both before and after traffic calming implementation takes place.

Peak traffic time (typically from 7:00 a.m. to 9:30 a.m. and 4:00 a.m. to 6:30 p.m. on the weekdays) on McKinley Street yielded an average count of 261 vehicles per hour. The peak volume (from the busiest hour) was 292 vehicles per hour. Off peak traffic times resulted in an average count of 137 vehicles per hour with 148 as the peak volume. Night time provided an average count of 78 vehicles per hour with a peak volume of 89 vehicles per hour.

Traffic counts will provide DDOT the data to evaluate traffic conditions after traffic calming implementation for it's effectiveness in meeting traffic calming objectives as well as it's impact to surrounding areas. Morrison Street, the only roadway running parallel and continuously through the study area represents an alternative route for cut-through traffic once McKinley Street traffic calming is implemented. Further study of both Morrison Street and McKinley Street will allow for traffic distribution to be re-evaluated after traffic calming implementation.

Speed readings were taken at two locations on McKinley Street, N.W.; station 8+00 monitoring eastbound traffic and station 18+50 monitoring westbound traffic; all locations and directions mentioned travel down grade (*see Appendix C2: Speed Readings*). The two locations were selected because of their proximity to down hill straight away stretches of McKinley Street where unobstructed vehicles are provided the opportunity to reach excessive speeds.

At station 8+00, down grade traffic was measured at an average speed of 26 m.p.h. and a peak speed of 32 m.p.h. Station 18+50 provided an average down grade vehicular speed reading of 25 m.p.h. with a peak speed of 34 m.p.h. With 25 m.p.h. as the legal and posted speed limit at both speed study locations, peak speeds recorded suggest the need for speed reduction.

Accident data on McKinley Street, N.W. has been incorporated into this study to observe any patterns of safety deficiencies within the study area. Areas where frequent accidents occur as reported by TARAS, will be further scrutinized for potential safety improvements (*See Appendix C4: Accident Report Data*).

Accident data along McKinley Street indicated the presence of accidents between parked vehicle, moving vehicles and pedestrians resulting in both injuries and damages to public and private property. Since McKinley Street produced a wide range of accident types at evenly distributed locations of the study area, an overall approach to improving traffic interaction will be the goal in reaching final recommendations. More detailed analysis of the accident reports and the associated locations along the McKinley Street are as follows.

The intersection of McKinley Street and Connecticut Avenue provided one accident. The accident involved two vehicles; one attempting to go straight rear ended the other vehicle turning right. The result was damage to the vehicles and no injury.

The intersection of McKinley Street and Chevy Chase Parkway yielded no accidents.

The intersection of McKinley Street and Nevada Avenue provided four accidents. Three of these accidents involved collisions at right angles suggesting a failure to stop at the intersection by one or more vehicles involved. In each case, vehicles were heading straight through the intersection. The fourth accident involved a side swipe between two vehicles. All four accidents resulted in property damages and one involved an injury.

The intersection of McKinley Street and Broad Branch Road yielded one accident. Two cars were involved in a right angle collision suggesting a failure to stop by one or more vehicles involved. Both vehicles were heading straight through the intersection. The accident resulted in property damages and no injuries.

The intersection of McKinley Street and 33<sup>rd</sup> Street yielded one accident. The accident was a side swipe between two vehicles where one vehicle attempted to overtake the other. The end result was property damage with no personal injury involved. A second accident happened approximately 50 feet from this intersection and involved damage to a parked vehicle by another vehicle attempting to park.

The intersection of McKinley Street and 32<sup>nd</sup> Street yielded one accident. The accident involved two vehicles traveling straight and colliding at a right angle. Property damage resulted, however no injuries were sustained. Two accidents happened at the 3200 block of McKinley Street away from the intersections and involved hit and run collisions to

parked vehicles. One incident involved an alcohol impaired driver traveling along McKinley while the other was a result of a motorist leaving a parking spot. No injuries resulted however property damages were sustained.

The most severe of accidents occurred recently on Broad Branch Road south of its intersection with McKinley Street. The accident resulted in the deaths of two passengers; speed was reported to be a contributing factor in the car losing control and striking a tree.

Analysis of overall traffic patterns of the study area revealed that McKinley Street, Broad Branch Road and Nevada Avenue represent the concentration of cut-through traffic. A map has been provided in *Figure 1: Traffic Patterns* to illustrate these findings. The general trend of traffic entering the study area during A.M. peak traffic travels westbound on McKinley Street towards Connecticut Avenue (*see Appendix C3: Turning Movements*). The opposite effect is assumed during the P.M. peak traffic situation.

McKinley Street, Nevada Avenue, Chevy Chase Parkway and Broad Branch Road represent the streets supporting the highest cut-through volumes within the study area. In providing effective traffic speed and volume reduction devices within the McKinley Street corridor, efforts need to be made so proposed devices address traffic safety concerns on all of these roadways. The intersections of McKinley with Broad Branch Road, Chevy Chase Parkway and Nevada Avenue will provide the best opportunity to calm traffic on all contributing streets. Therefore, by implementing traffic calming devices at these locations, all four streets can benefit from improvements in traffic safety not only immediately surrounding McKinley Street, but at distances along these roadways well outside the study area.

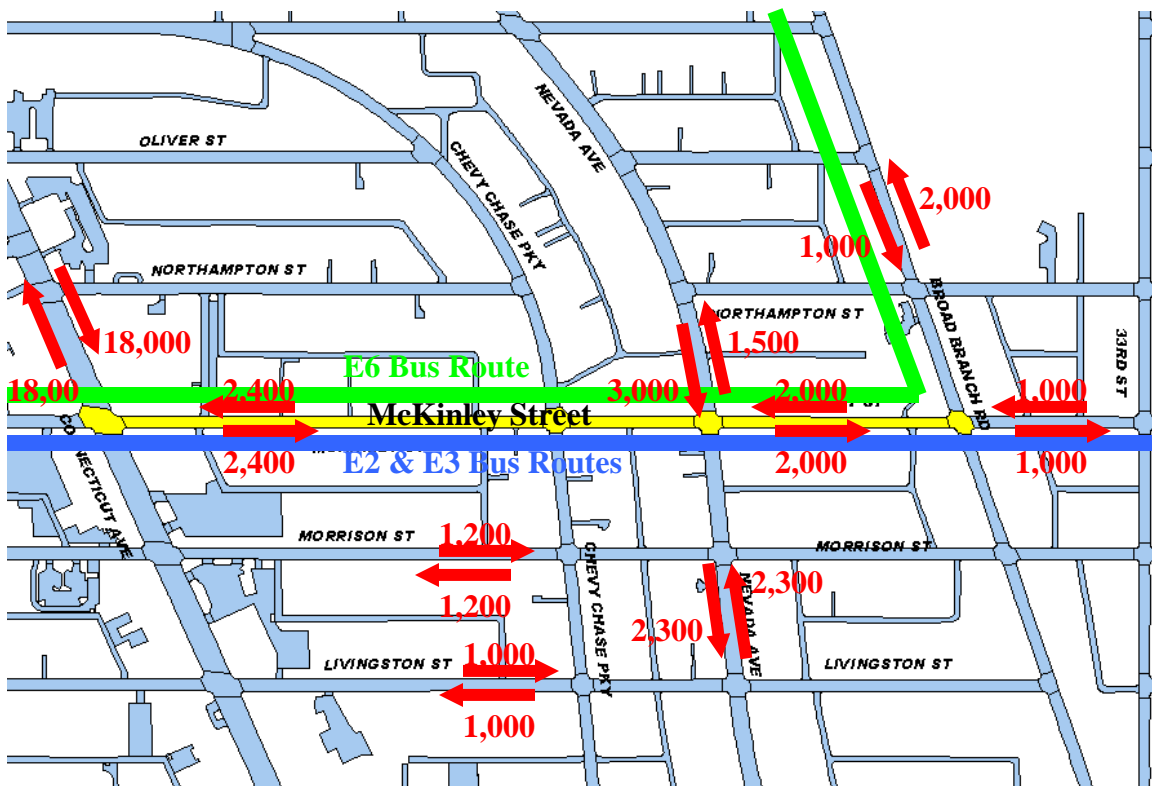


Figure 1: Traffic Patterns

### III. Recommendations

In evaluation of the aforementioned study findings, the McKinley Street study area limits were expanded east of Broad Branch Road to Nebraska Avenue. The two sides of McKinley Street split by Broad Branch Road provided different traffic patterns in the pavement markings and parking regulations provided.

Furthermore, the study area was broken into critical locations. These locations will merit traffic calming measures based on their individual demonstration of excessive vehicular speeds, accidents and/or volumes in addition to inherently unsafe pedestrian/vehicle traffic patterns. However, prior to mentioning the individual locations and devices employed, a general description of the traffic calming approach taken is in order.

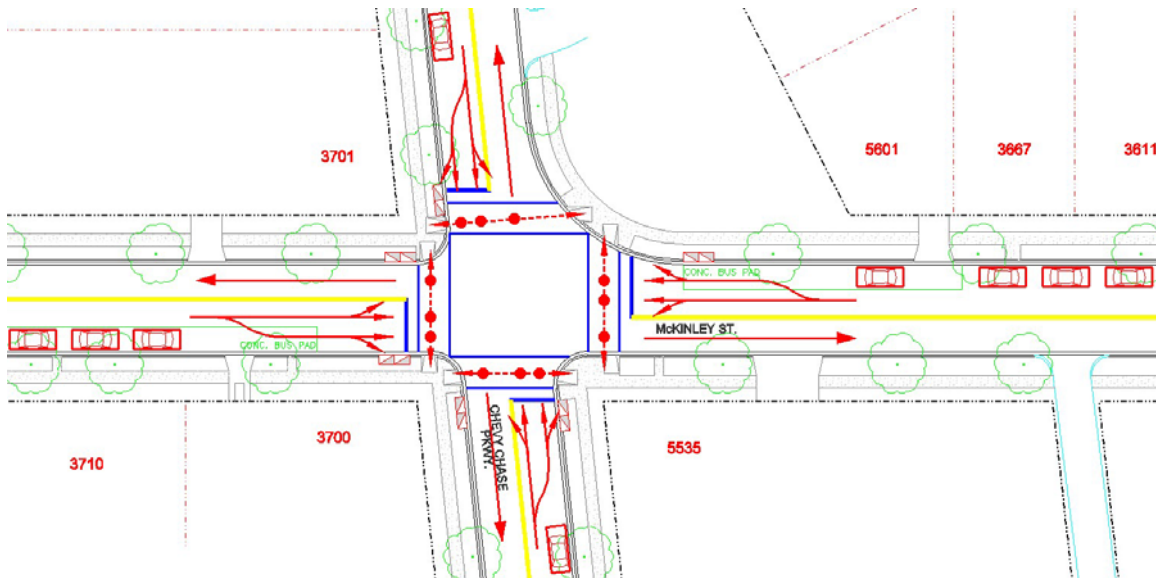
Two types of traffic situations exist in the McKinley Street study area; the **intersection** and the **mid-block straightaway**. These two areas of traffic operation serve their own unique purpose. Properly designed intersections allow for safe and efficient travel through a controlled area of mixed use traffic interaction. A mid-block straightaway offers rights of travel to vehicles and bicycles and in the case of McKinley Street provides resident and visitor parking.

**Intersections**, either signalized or four-way stop, provide an effective means of managing traffic for a roadway. All intersections in the study area employ these types of traffic management. Therefore, unable to provide additional quantity of traffic



management locations (four-way stop intersections), quality measures will be taken to increase their efficiency and safety in governing traffic traveling through the study area.

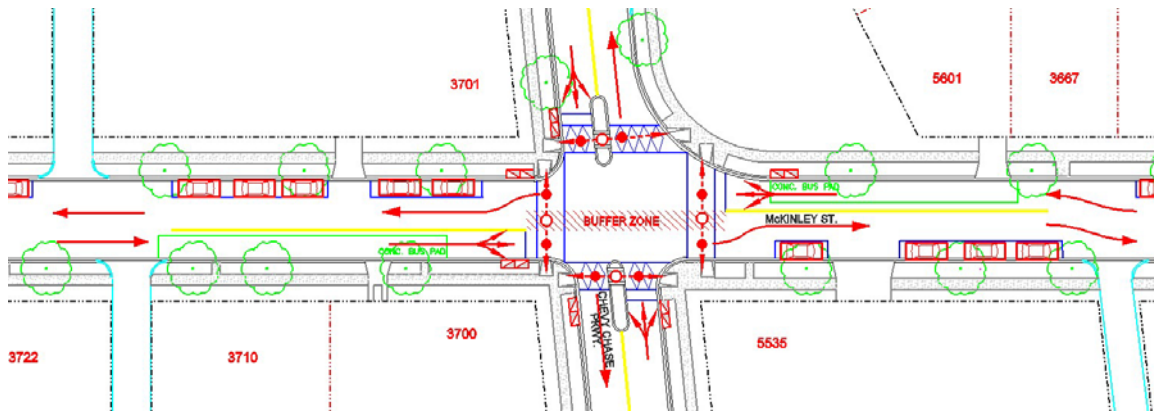
As seen below in *Figure 1a: Existing Intersection Traffic Pattern*, the typical existing intersection for McKinley Street is comprised of four approaches with solid double yellow lines providing established travel ways in each direction and parallel parking on one side of the roadway.



**Figure 1a: Existing Intersection Traffic Pattern**

Safety concerns are evident at the approaches to the four-way stop signs on both intersecting streets. There is currently 17 feet of travel way available in each direction for vehicles to enter the intersection of McKinley Street. Depending on parking, this can lead to vehicles crowding and/or pulling side by side at the intersection causing a three lane configuration delineated by red arrows representing vehicular movement through the intersection. The movement of pedestrians through the intersection is shown by dashed red arrows. Points of paths crossing between vehicles and pedestrians are shown by solid red dots.

Through modification of pavement markings and parking restrictions, an alternative approach will improve upon the safety concerns found in the typical existing McKinley Street intersection. The established two-way traffic in the approaches to a typical intersection in the existing scenario is a necessity and therefore will be maintained in the recommended design. However, once adequate capacity in each direction of the approaches is assured and traffic has successfully negotiated the intersection, double yellow pavement striping will no longer be employed (*see Figure 1b: Proposed Intersection Traffic Pattern*).



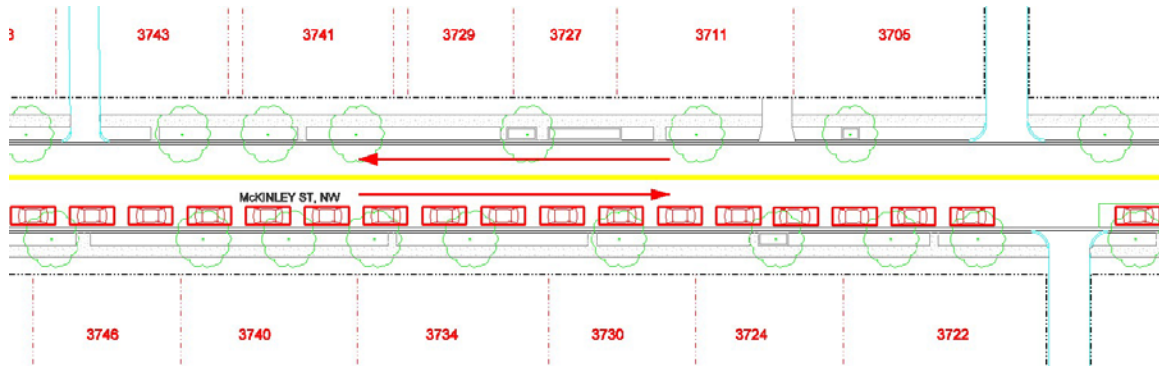
**Figure 1b: Proposed Intersection Traffic Pattern**

At a distance determined by peak hour vehicle counts, turning movements and SYNCHRO traffic modeling software, two 11 foot single file lanes shall be maintained in the approaches using solid double yellow pavement striping. Away from the intersection, the double yellow striping will end and traffic will shift according to the recommended parking configuration. Through the intersection, two 11 foot travel ways will be maintained and divided by a 6 foot buffer zone. All day parallel parking represented by red cars outlined in blue will be provided in the exiting direction of the approaches. These blue lines, representative of white pavement striping will be recommended to further distinguish parking areas from travel ways.

This configuration will provide the following advantages over the existing configuration. First, pedestrians crossing McKinley Street will have less vehicular traffic to negotiate. In the existing scenario, Figure 1a shows three solid red dots where pedestrian/vehicle path crossings occur during a pedestrian roadway crossing. In the proposed configuration, Figure 1b shows a roadway crossing involving two vehicle/pedestrian path crossings. In the recommended scenario, Figure 1b uses hollow red circles to show where the elimination of the third vehicle/pedestrian crossing creates an area protecting pedestrians; at pedestrian refuges on Chevy Chase Parkway and within the buffer zone on McKinley Street.

Also bus stops, shown as green rectangles, will not be blocked by parked cars and motorists will not be permitted to pass buses while loading and unloading passengers as in the existing scenario. Another advantage of the recommended configuration will be created for vehicles parallel parking near an intersection. Any parking near an intersection will occur from the travel way exiting the intersection where distribution between vehicles is greatest. These locations provide the parking motorist more time and space from vehicles approaching from the rear than if situated in the direction entering the intersection as in the existing condition. Furthermore, parking spaces will be available on both sides of the street although not directly across from one another. Providing parking on both sides of the road at opposite ends of the blocks will reduce trips taken by residents walking across mid-block sections of McKinley Street to and from their vehicles, another safety concern found in the existing scenario.

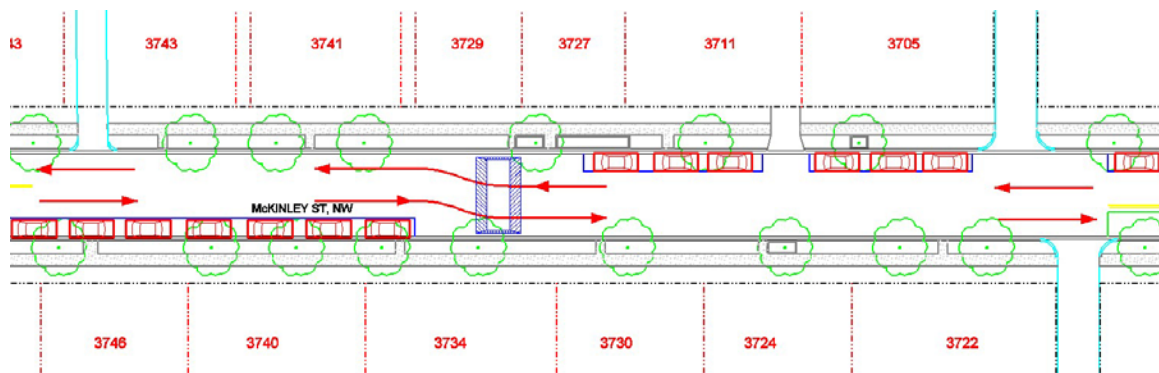
The second type of area found in McKinley Street is the **mid-block straightaway**. Depending on vertical geometry and length of straight-away, these areas present problems because of the speeds traveled by vehicles (*see Figure 2a: Existing Mid-Block Traffic Pattern*).



**Figure 2a: Existing Mid-Block Traffic Pattern**

As shown above, the double yellow line divides traffic consistently for the duration of the block length. Parallel parking is permitted on the side of the road with room permitting (in this case on the south side of the road). Vehicles traveling in their own unobstructed travel way, are given the feeling they are completely at the right-of-way at all times and less concerned with the immediate surroundings.

By eliminating the double yellow pavement striping at mid-block locations and staggering parking as shown below in *Figure 2b: Proposed Mid-Block Traffic Pattern*, a shift in the alignment of the traffic flow has been implemented. The end result will be a reduction in speeds traveled through these previously uncontrolled stretches of McKinley Street.



**Figure 2b: Proposed Mid-Block Traffic Pattern During Peak Hours**

*Figure 2b* shows the lane distribution providing parallel parking outlined in blue. Those parking spaces will be outlined by white pavement striping and reside permanently outside the vehicular travel way. Additional safety will be provided with this parking configuration in the mid-block sections by reducing the amount of pedestrians crossing McKinley Street to and from parked vehicles in these areas intended for vehicular travel.

The recommended reconfiguration of pavement striping and parking will implement a chicane like movement on traffic traveling through the study area, another DDOT approved traffic calming measure. By promoting coordination between on coming vehicles, the recommended configuration will raise the attention levels of motorists throughout the mid-block straightaway and effectively reduce motorist speeds. Approximately 110 day time (peak hour) parking spaces will be available to residents and visitors along the section of McKinley Street. This will equal or slightly exceed the number of existing parking spaces currently available in the existing parking configuration.

Based on Department of Public Works (now DDOT) 1996 policy an “existing” collector street must be a minimum of 30’ wide to permit parking on both sides with two way traffic. McKinley Street is 28’ wide and does not meet this requirement; therefore parking should not be permitted on both sides opposite each other.

In summary, the recommendation for roadway reconfiguration will provide single file access to and from intersection approaches for all directions of traffic and an effective chicane for the vehicle travel-way. The aforementioned recommended roadway reconfiguration combined with physical traffic calming devices will further accomplish traffic calming objectives on McKinley Street.

Conventional traffic calming, as defined by DDOT and the Institute of Transportation Engineers (ITE), uses changes in roadway alignment, installation of barriers and other physical measures to reduce traffic speeds and/or cut-through volumes. The most common physical traffic calming devices are speed humps and bumps. McKinley Street, N.W. provided limited opportunity for physical traffic calming devices due to its status as a bus route and collector road.

McKinley Street provides service to approximately 700 bus patrons per day in the immediate area. These buses were explained by WMATA as unable to sustain the continual abuse brought on by speed humps and/or bumps. These devices also presented unsafe riding conditions for bus patrons due to the severe reaction of buses traveling over them. However, WMATA and other traffic calming publications have approved a traffic calming device known as a speed table in areas supporting bus routes.

A speed table is an elongated speed bump with a flat section separating the two transitions in and out of the device. For McKinley Street, speed tables have been recommended for the areas lending themselves to excessive vehicular speed. These areas are further characterized by mid-block stretches of roadway on downhill straight aways (*Figure 2b: Proposed Mid-Block...*). By effectively implementing speed tables along with the horizontal shifts (chicanes) in traffic associated with the recommended striping and parking plan, significant reduction in vehicle speeds will be achieved on McKinley Street, N.W. corridor.

In further addressing pedestrian safety at the intersections of McKinley Street, physical devices will be utilized on those roads intersecting McKinley Street and not supporting

bus routes. Chevy Chase Parkway and Nevada Avenue provide opportunity to install raised crosswalks and pedestrian refuges (*Figure 1b: Proposed Intersection...*). The raised crosswalks, which come in a variety of material compositions, will be utilized for pedestrian traffic inside roadway intersections. Pedestrian refuges provide either a narrow grass or paved surface enclosed by curbing located in the middle of a roadway allowing exclusive access for pedestrians.

Raised crosswalks will require more complete stops for vehicles crossing McKinley Street in addition to providing better visual emphasis to vehicles approaching pedestrian crossing areas. The pedestrian refuges will improve safety by lowering the time and distance required for pedestrians to cross the street as well as allowing pedestrians to negotiate one direction of traffic at a time.

The combination of raised cross walks and pedestrian refuges can also be considered a neighborhood entrance or gateway as defined in the District Traffic Calming Handbook. Since McKinley Street provides for the majority of vehicular travel entering, exiting and passing through the study area, it constitutes a border between neighboring blocks. The roadway approaches bordering McKinley Street represent an effective means of communicating to motorists they are transitioning from a collector street to a local street and residential setting.

The raised cross walks will not be implemented into the McKinley Street roadway provided one exception; at the intersection of McKinley Street and Broad Branch Road, near Lafayette Elementary School, where the quantity and consistency of pedestrian and vehicular interaction require additional precautionary measures. Therefore, at this location, raised crosswalks on McKinley Street and 15 m.p.h. speed limit signs (when children present) posted at a distance away from the intersection on all approaches will provide the safety improvements needed. This recommendation represents a compromise of maintaining operation of buses servicing the roadway and improving pedestrian, resident and cyclist safety in this sensitive location.

The intersection of Broad Branch Road and McKinley Street is at the approximate center of the study area. Because of its central location, implementation of a physical device here would lower cut-through traffic while minimally impacting resident and bus vehicular travel. The raised cross walks proposed on Nevada Avenue and Chevy Chase Parkway will not only provide additional safety for pedestrians on McKinley Street, but also discourage cut-through traffic on the intersecting roadways.

With the above text providing the methodology for the traffic calming approach taken for the McKinley Street, N.W. study area, the following locations in the study area have been recommended for traffic calming device implementation. The details of these locations and their respective traffic calming measures will be as follows:

- 1. Intersection of Connecticut Avenue, N.W. and McKinley Street, N.W.** (*see Appendix D1*) – This location is at a signalized intersection. High levels of both pedestrians and vehicular traffic are present here. Both commercial and

community establishments provide complicated traffic patterns for visitors, deliveries and passers through. PSI recommends a painted neck down to establish roadway channelization early on for eastbound traffic entering McKinley Street from here. With a bus stop platform and established lane distribution offering little flexibility, a painted neck down will serve as shelter for oncoming parked vehicles and provide motorists advanced warning to the approaching travel way configuration.

2. **McKinley Street, N.W. Station 8+00** (*see Appendix D2*) – This location is approximately midway between the vertical peak of McKinley St, N.W. (Station 3+75) and the intersection of McKinley Street with Chevy Chase Parkway, N.W. This stretch of McKinley is on a -4.5% grade. Recommendations here consist of a speed table and a horizontal shift in traffic around parking areas to impede excessive speeds detected by field speed readings.
3. **Intersection of McKinley Street, N.W. and Chevy Chase Parkway, N.W.** (*see Appendix D3*) – This location is a four way stop intersection. Recommendations include pedestrian refuges and raised crosswalks on each approach of Chevy Chase Parkway.
4. **Intersection of McKinley Street, N.W. and Nevada Avenue, N.W.** (*see Appendix D4*) – This location is a four way stop intersection. Recommendations include pedestrian refuges and raised crosswalks on each approach of Nevada Avenue.
5. **McKinley Street, Station 19+00** (*see Appendix D5*) – This location is approximately midway between the intersections of Nevada Avenue (Station 15+50) and Broad Branch Road (Station 22+00). This stretch of McKinley is on a +7.0% grade. Recommendations here consist of a speed table and a horizontal shift in traffic around parking areas to impede excessive speeds detected by field speed readings.
6. **Intersection of McKinley Street, N.W. and Broad Branch Road, N.W.** (*see Appendix D6*) – This location is a four way stop intersection. Recommendations include raised crosswalks on each approach of Broad Branch Road. Also, raised crosswalks are recommended in each approach of McKinley Street. The bus stop pad located in the eastbound lane will be relocated to the west side of the intersection. By doing so, buses will make one stop at this intersection rather than two in the existing scenario.
7. **McKinley Street, N.W. Station 30+00** (*see Appendix D7*) – This location is approximately midway between the intersections of 33<sup>rd</sup> Street (Station 26+50) and 32<sup>nd</sup> Street (Station 33+50). This stretch of McKinley is on a -5.7% grade. Recommendations here consist of a speed table and a horizontal shift in traffic around parking areas to impede excessive speeds detected by field speed readings.

**Miscellaneous Recommendations** (*see Appendix D9*) Overall recommendations for the study area will involve the implementation of parking regulation signage and pavement markings. These signs will specify where parking will be permitted. Additional signage will be implemented at the approaches to the Broad Branch Road and McKinley Street intersection communicating to motorists to obey a 15 m.p.h. speed limit when children are present. Pavement re-striping will be recommended throughout the entire study area as described in this study. Intersections, parking areas, cross walks, raised pedestrian cross walks and speed tables will all involve new striping patterns.

Once implementation of traffic calming measures is final, a certain amount of traffic diversion should be expected. Traffic diversion represents the removal of cut through traffic from McKinley Street and onto surrounding roadways. As a direct result of traffic calming approaches taken on McKinley Street the roadways immediately surrounding McKinley Street that could suffer the effects of traffic diversion are Morrison Street, Livingston Street and Northampton Street (*see Appendix A: Study Area Map*).

ITE publications suggest that effective traffic calming measures provide a range of diversion from 2% to 36% with the average being 15%. Quantifying the amount of traffic diversion beyond these estimates is difficult, however granted that three to four viable alternative routes exist, distributing 15% of McKinley Street's daily traffic over three or four roadways should not provide drastic impact to any of these roadways.

Morrison Street provides the most access to and from the McKinley Street study area when compared to the other neighboring streets and therefore is the most probable alternate route to McKinley Street. Morrison Street borders McKinley Street one block to the south and spans from Connecticut Avenue to Nebraska Avenue, the entire length of the study area. The existing traffic volumes for Morrison Street are approximately half those of McKinley Street.

Livingston Street runs parallel to McKinley Street two blocks to the south. It spans across the study area from Connecticut Avenue to Broad Branch Road. Access to Livingston Street from Connecticut Avenue is signalized which could further facilitate it as an alternative route to McKinley Street. The existing traffic volumes for Livingston Street are slightly less than those of Morrison Street (approximately 10% less).

Northampton Street runs parallel to McKinley Street one block to the north. It spans from Connecticut Avenue to Chevy Chase Parkway and from Nevada Avenue to Nebraska Avenue. The discontinuation of Northampton Street between Chevy Chase Parkway and Nevada Avenue limit its practicality as an alternative route to McKinley Street. The traffic volumes along Northampton Street are not available from this study, however field observation suggests they are significantly lower than those of Morrison and Livingston Street.

#### IV. Cost Estimate

##### 1. Speed Tables

McKinley Street stations 8+00, 19+00 and 30+00

Asphalt table with reflective markings:

$$\begin{array}{r} \$5,000 \text{ each } \times 3 = \$15,000 \\ \$200 \times 3 = \$400 \end{array}$$

2 sign and post assemblies:

$$\$100 \text{ each } \times 2 = \$200 \times 3 = \$600$$

$$\begin{array}{r} \text{Sub-Total} = \text{-----} \\ \$16,000 \end{array}$$

##### 2. Raised Crosswalks

Chevy Chase Parkway, Nevada Avenue and Broad Branch Road

Asphalt crosswalk with reflective markings:

$$\begin{array}{r} \$2,000 \text{ each lane } \times 16 = \$32,000 \\ \$200 \times 16 = \$3,200 \end{array}$$

$$\begin{array}{r} \text{Sub-Total} = \text{-----} \\ \$35,200 \end{array}$$

##### 3. Pedestrian Refuges

Chevy Chase Parkway, Nevada Avenue and Nebraska Avenue

Superimposed Concrete Pedestrian Refuge Island:

$$\$5,000 \text{ each } \times 6 = \$30,000$$

Sign and post assemblies:

$$\$100 \text{ each } \times 6 = \$600$$

$$\begin{array}{r} \text{Sub-Total} = \text{-----} \\ \$36,000 \end{array}$$

##### 4. Parking and Pavement Marking Reconfiguration

4" thermoplastic pavement striping:

$$\$1.00 \text{ per foot } \times 10,000 = \$10,000$$

6" thermoplastic pavement striping:

$$\$1.00 \text{ per foot } \times 2,000 = \$2,000$$



12" thermoplastic pavement striping:

$\$1.50 \text{ per foot} \times 550 = \$825$

Parking posts and signs:

$\$100 \text{ each} \times 100 = \$10,000$

15 m.p.h. While Children Present signs/Flashing Beacons:

$\$200 \text{ each} \times 4 = \$800$

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Sub-Total = \$22,825

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**Total = \$77,625**

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## **Appendix B: McKinley Street Roadway Profile**

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